Evolution of 100G Host to Module

IEEE CEI-28G VSR AdHoc

Ali Ghiasi
Broadcom Corporation

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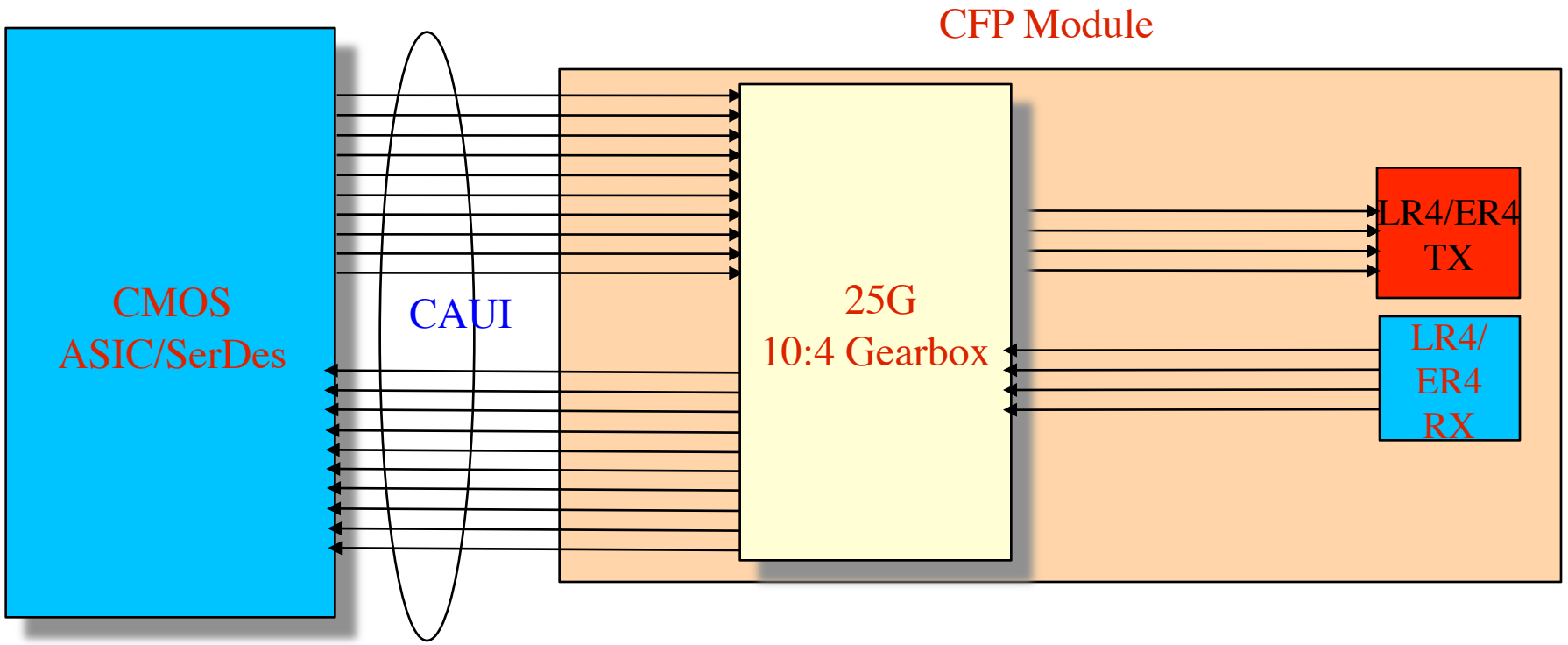
Overview

- **Work in progress**
- **VSR baseline channel is 4” long**
  - **Can we meet 10” or 16.5 dB with simpler equalizer in the module**
- **Can the combination of improved package or driver with next generation connector allow possibility of unretime**

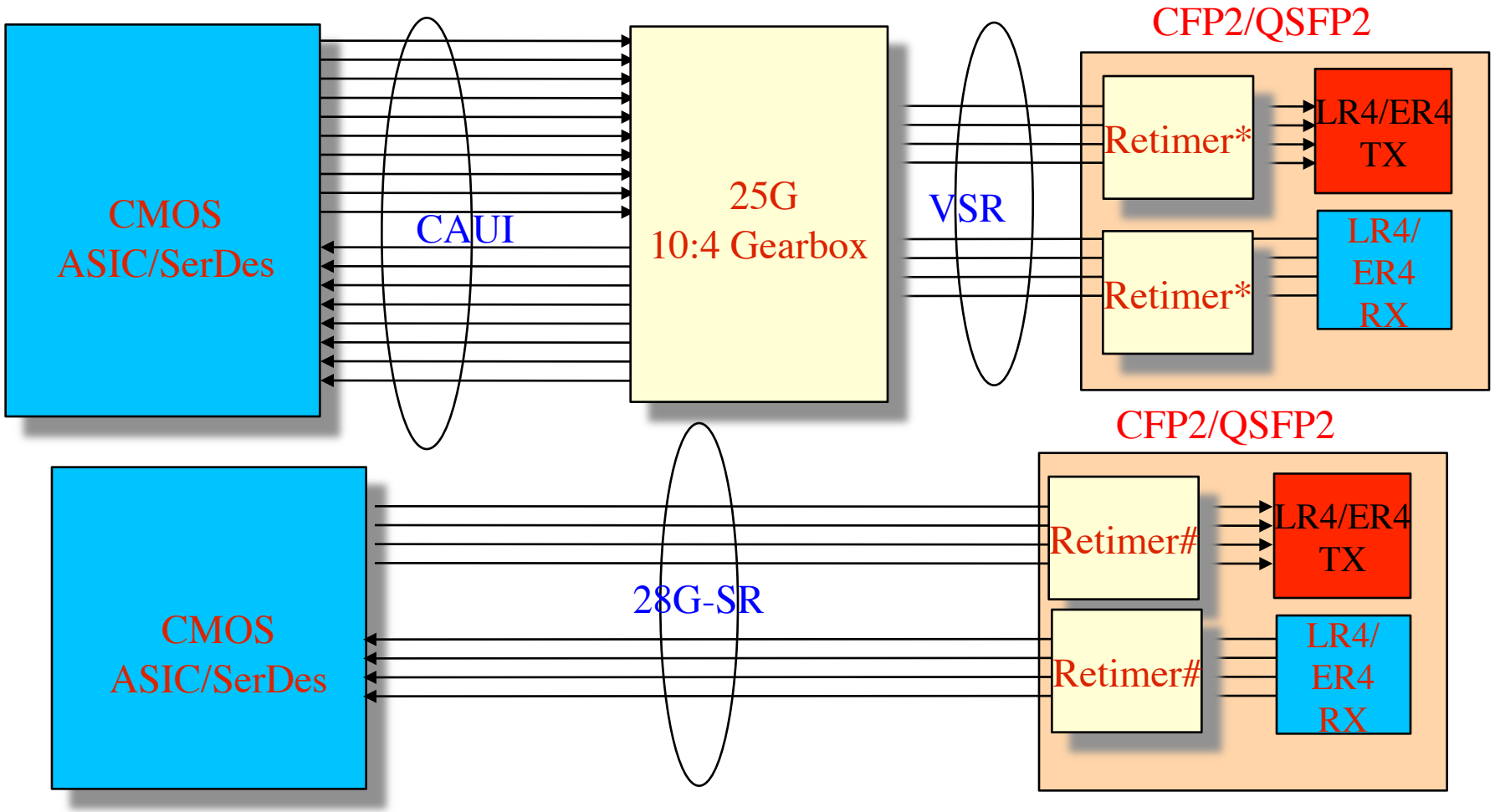
100 Gig CFP Module (Gen I) "Market Enabler"

- **Robust but too big and we all agree!**



Possible 28G Applications Model

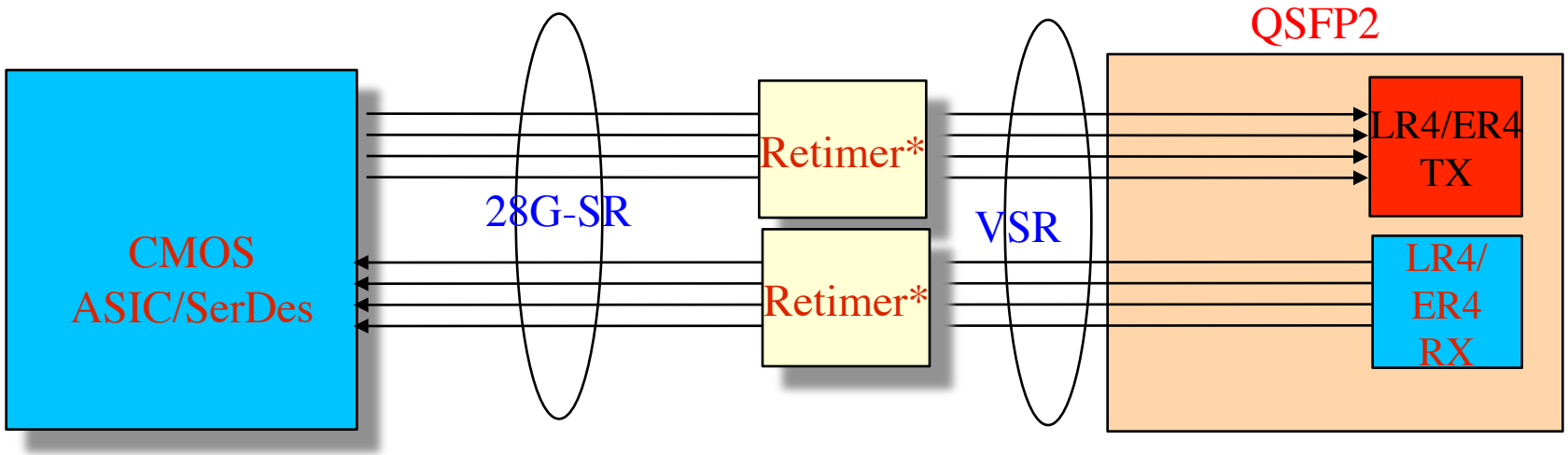
- **Application model emerging**



*Full retiming my not be required

#Full retiming likely required but PD will exceed QSFP2 limit

28G Applications Model Cont.



*Assuming in the case of QSFP2 the retimers are external it solves the power issue and distance

Option Moving Forward

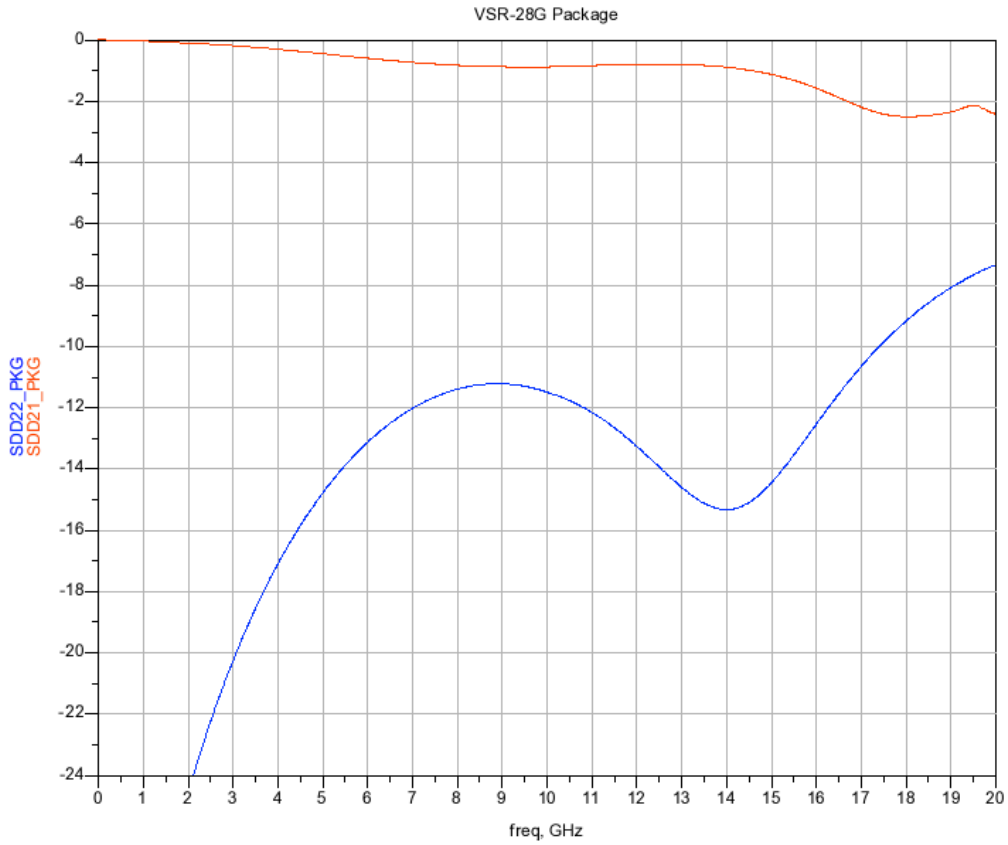
- **QSFP2 likely has to be unretimed/half retimed due to PD and CFP2 could be retimed fully, option on how to proceed?**
  - **Define 4" full retime**
  - **Define 10" retime**
  - **Define unretime/half retime**
  - **Define 4" full/half retime**
  - **If we do not create a super-set then we can end up with 4 plausible interfaces!**
- **Propose to have two interfaces**
  - **Phase I- nAUI like interface to support 4" host PCB without back channel and 10" with back channel**
  - **Phase II- nPPI like interface to support 4" of host PCB**

Simulation Investigation

- **How long can full retime interface be?**
  - **4" is current baseline**
  - **What is penalty going to 10" or 16.5 dB loss**
- **Is unretime feasible**
  - **Based on Gen 1 transmitter**
  - **Or need to wait for Gen 2 transmitter**
- **If unretime possible then half retime is also possible**
  - **Better to define a full retime interface nAUI like**
  - **2nd interface can be unretiemd or optional retiemd nPPI like**
- **For the most basic equalizer setting 2 tap FFE is used instead of optimizing CTLE to each channel.**
  - **The assumption here is that TX FFE and CTLE will do as good as 2 tap adaptive FFE**

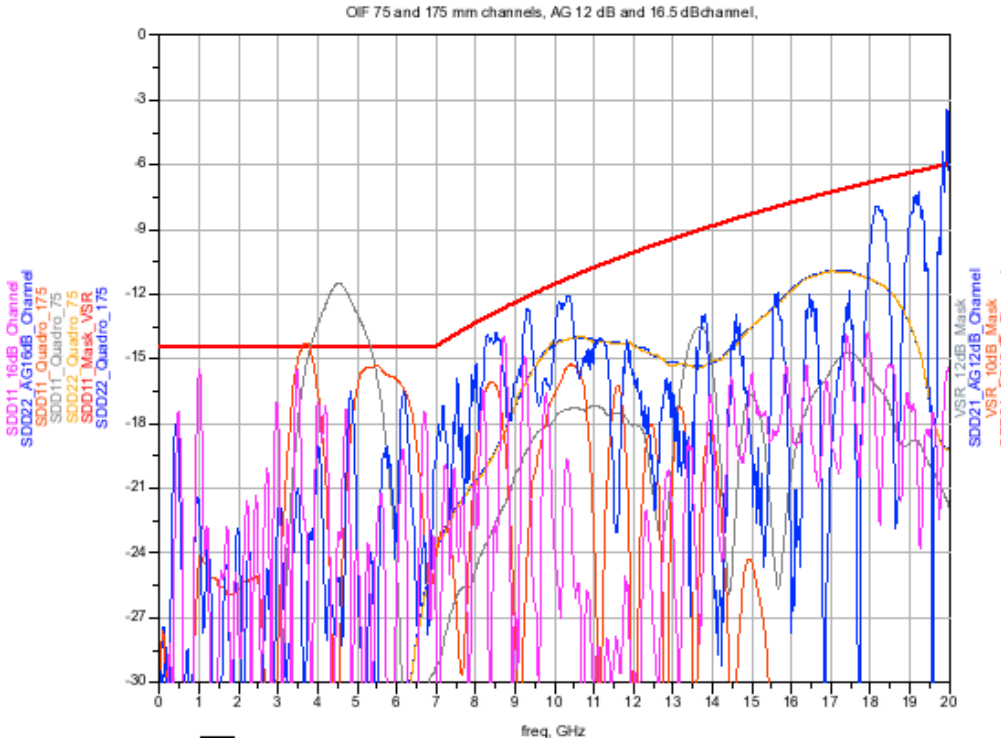
Package Used for the Simulation

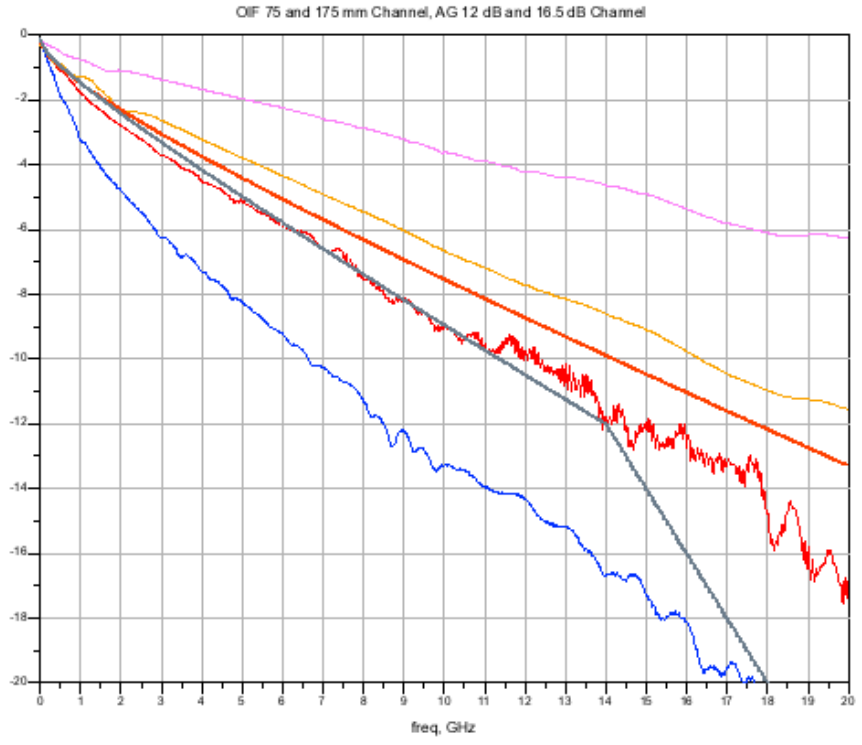
- **Package adds about 3.7 ps of DJ**



Channel Used for Simulation

- **Tyco 75 mm, Tyco 175 mm, AG 12 dB, and AG 16.5 dB**

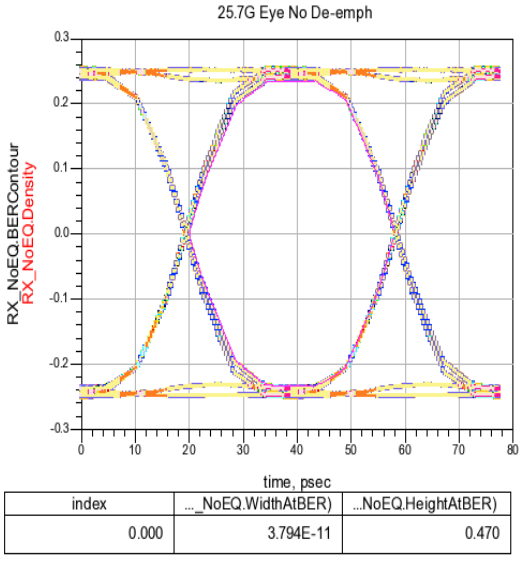




Gen 1 and Gen 2 Transmitter

- **Gen 1 transmitter added PJ=4 ps with RJ=6.6 ps**
- **Gen 2 transmitter added PJ=2 ps with RJ=3.3 ps**
- **Additional jitter also added due to package**

Ideal Driver



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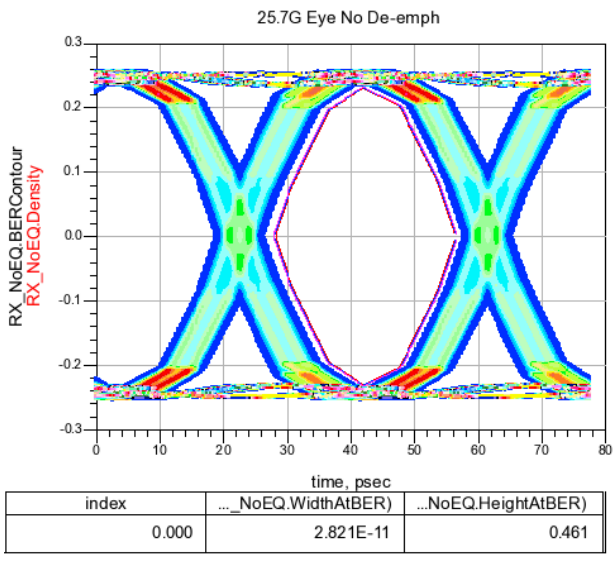
Gen 1



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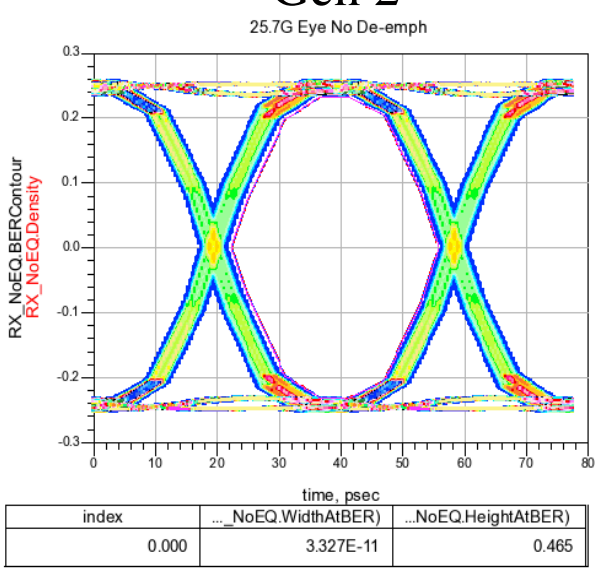
Gen 2



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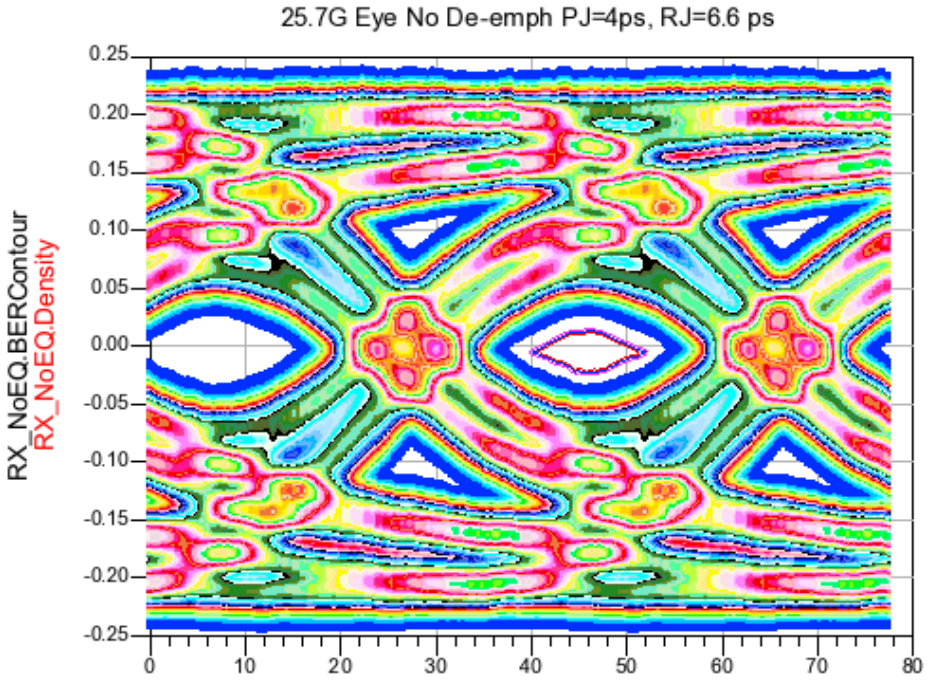
Tyco 175 -25 mm Channel

- **Receiver 2 tap FFE with Gen 1 transmitter**



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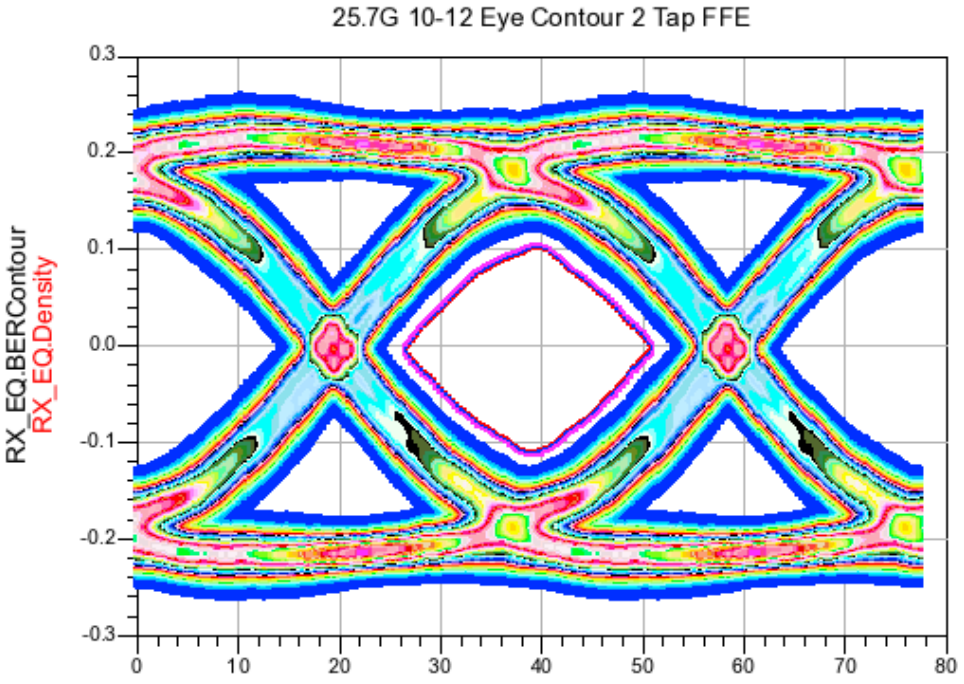

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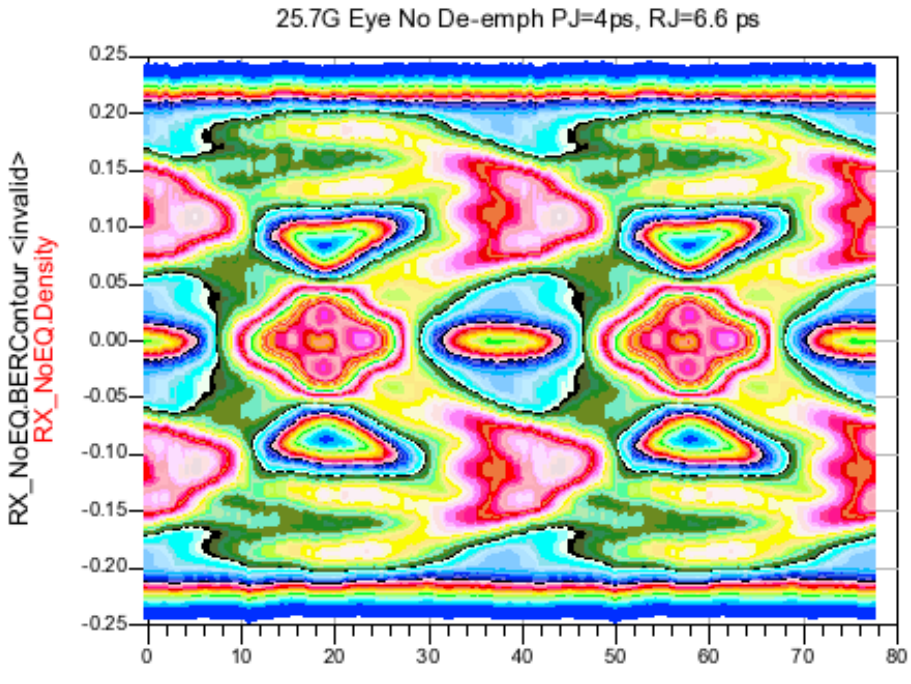
AG 12 dB Channel

- **Receiver 2 tap FFE with Gen 1 transmitter**



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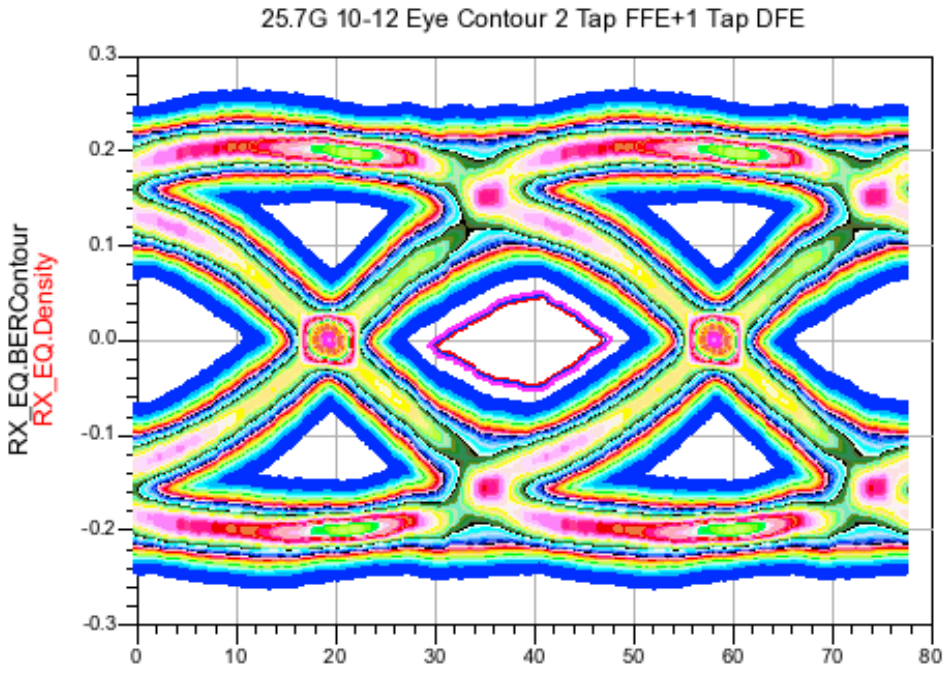

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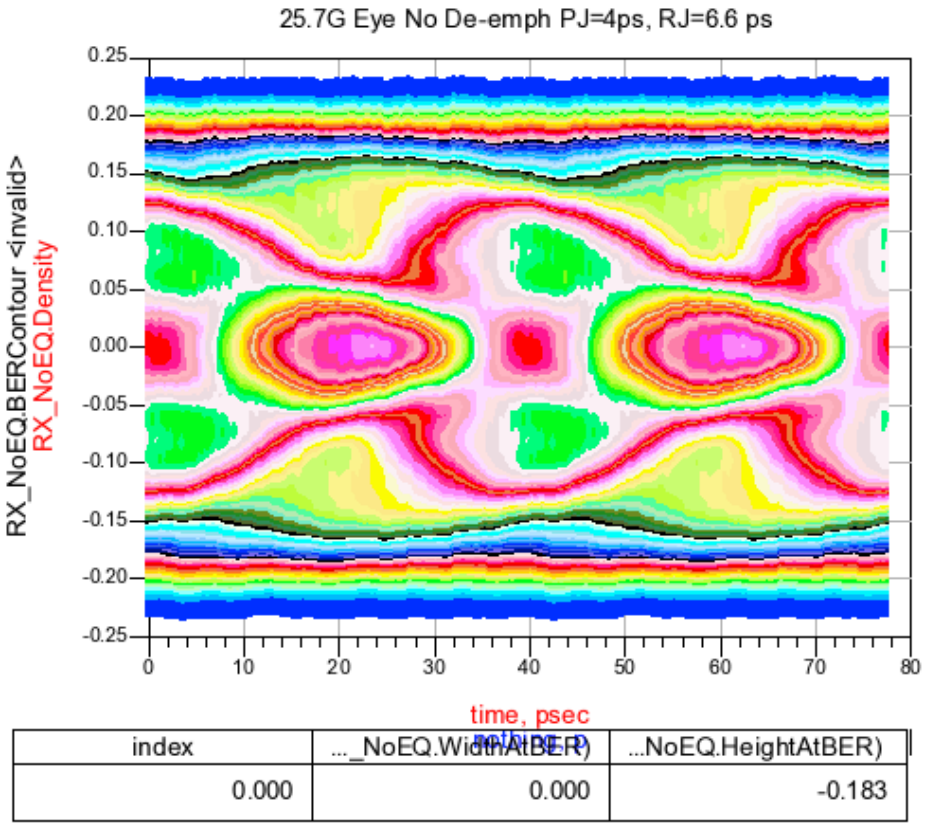
AG 16.5 dB Channel

- **Receiver 2 tap FFE with Gen 1 transmitter**



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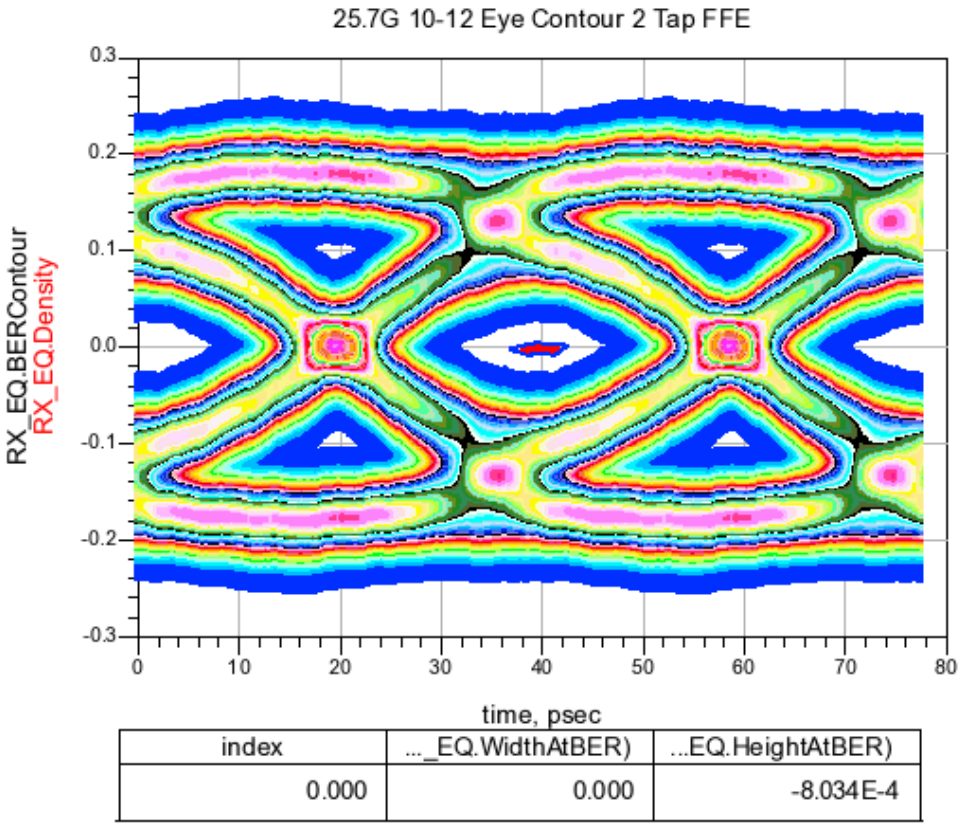

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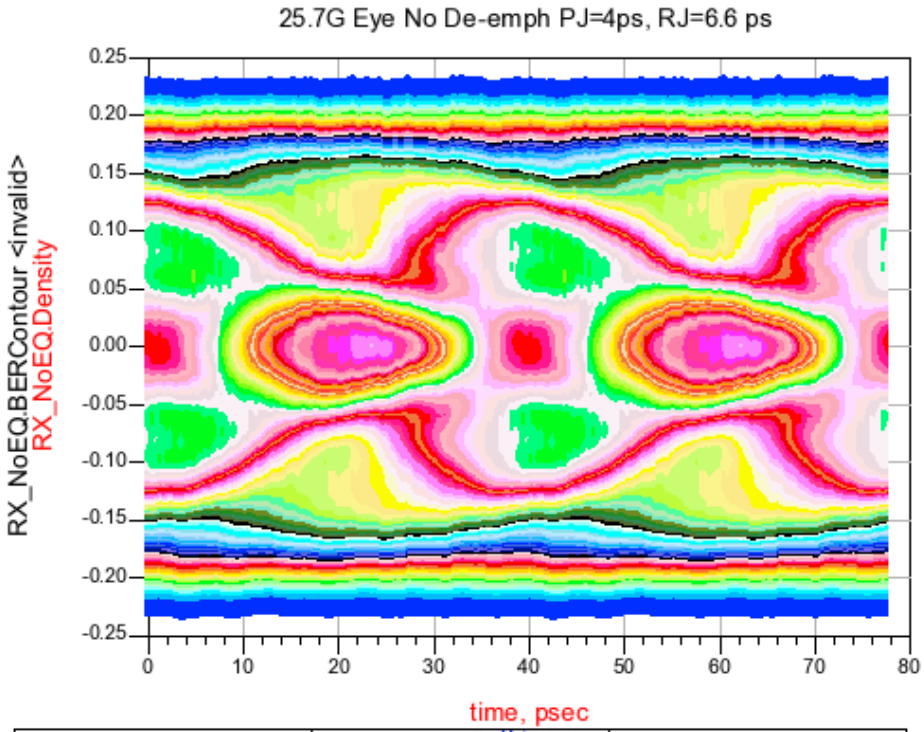
AG 16.5 dB Channel

- **Receiver 2 tap FFE + 1 DFE with Gen 1 transmitter**



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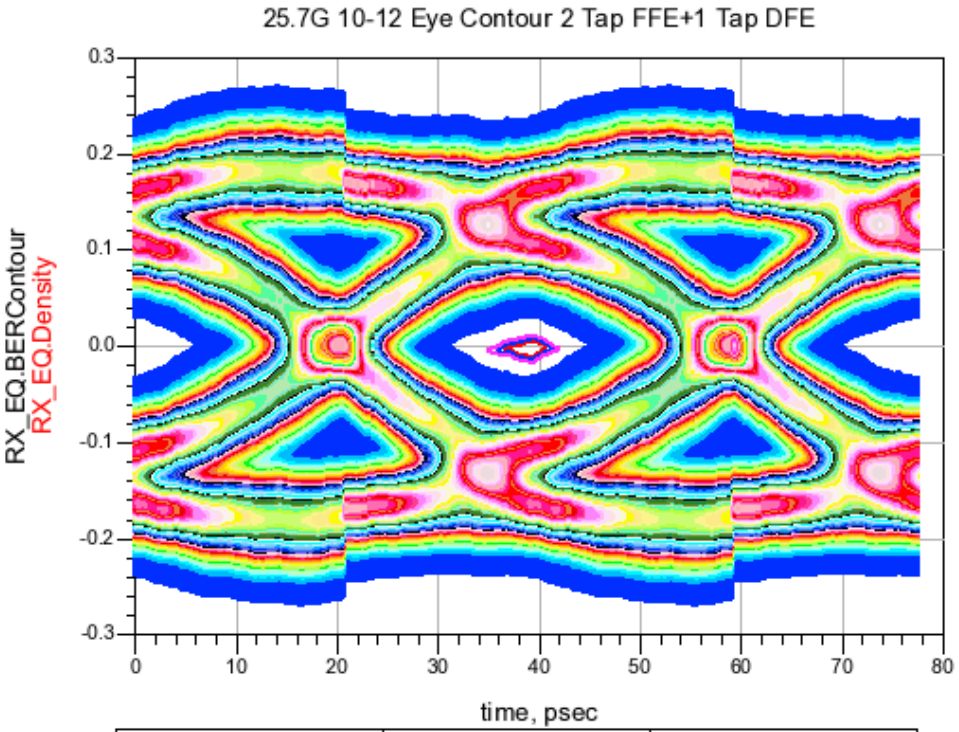
0.000	0.000	-0.183



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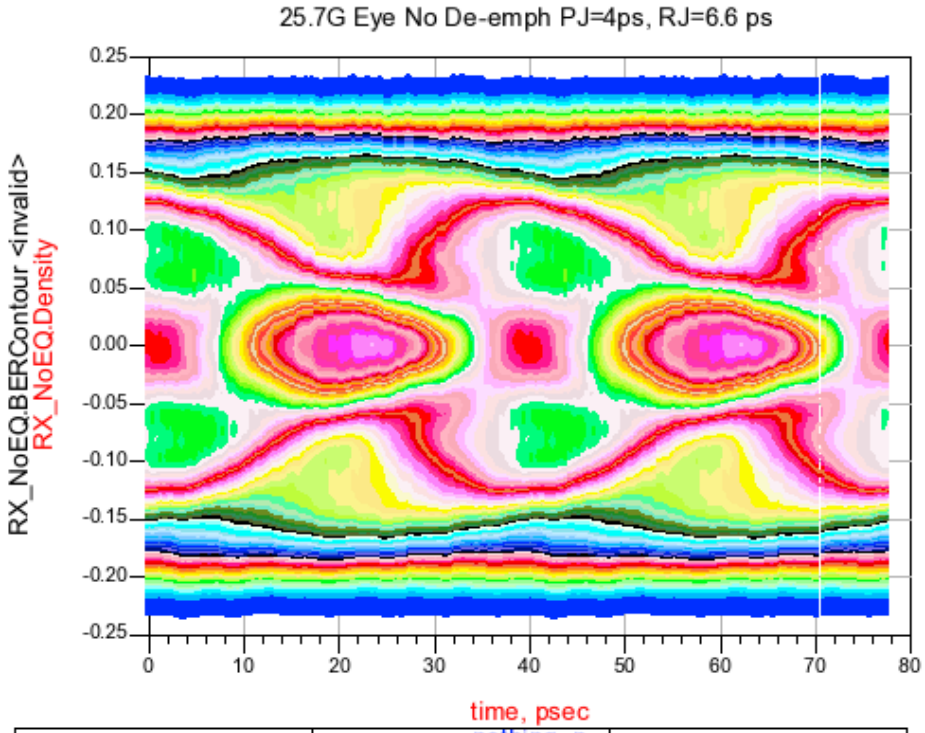
AG 16.5 dB Channel

- **Receiver 2 tap FFE + 2 DFE with Gen 1 transmitter**



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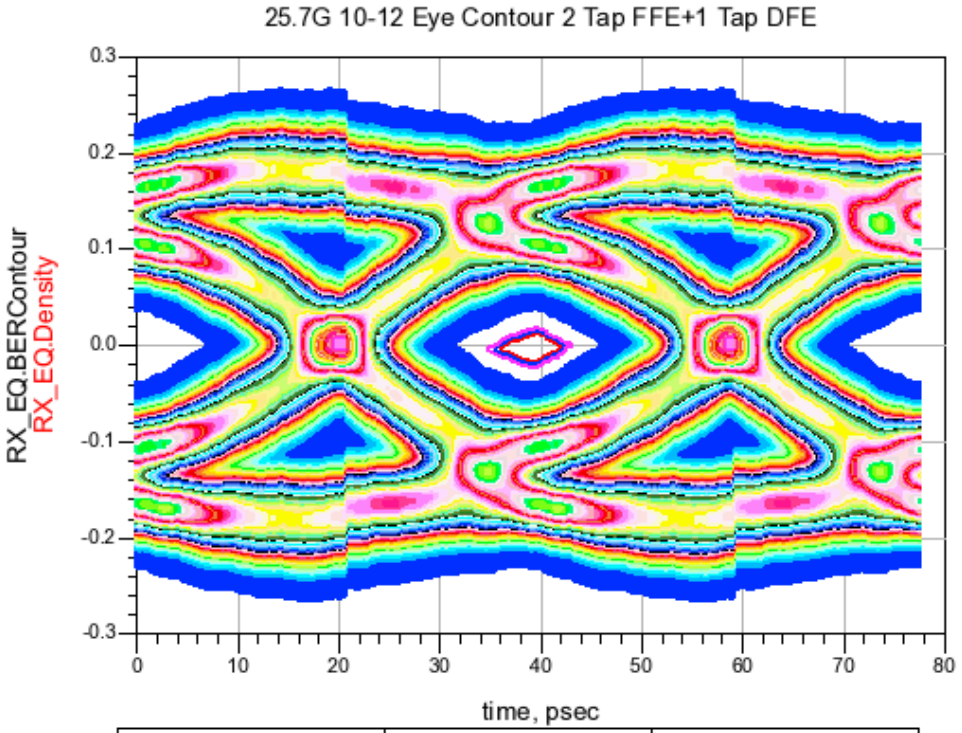

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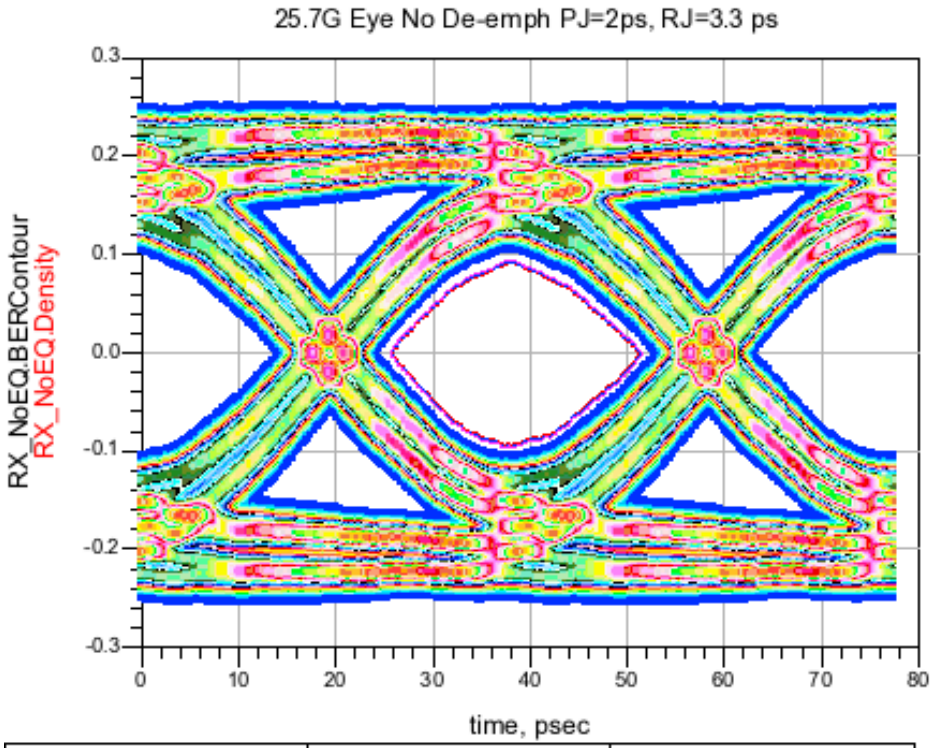
Gen 2 EW=9.14 ps and EH=39 mV

Tyco 75 mm

- **Gen 2 transmitter shows feasibility of unretiemd interface**



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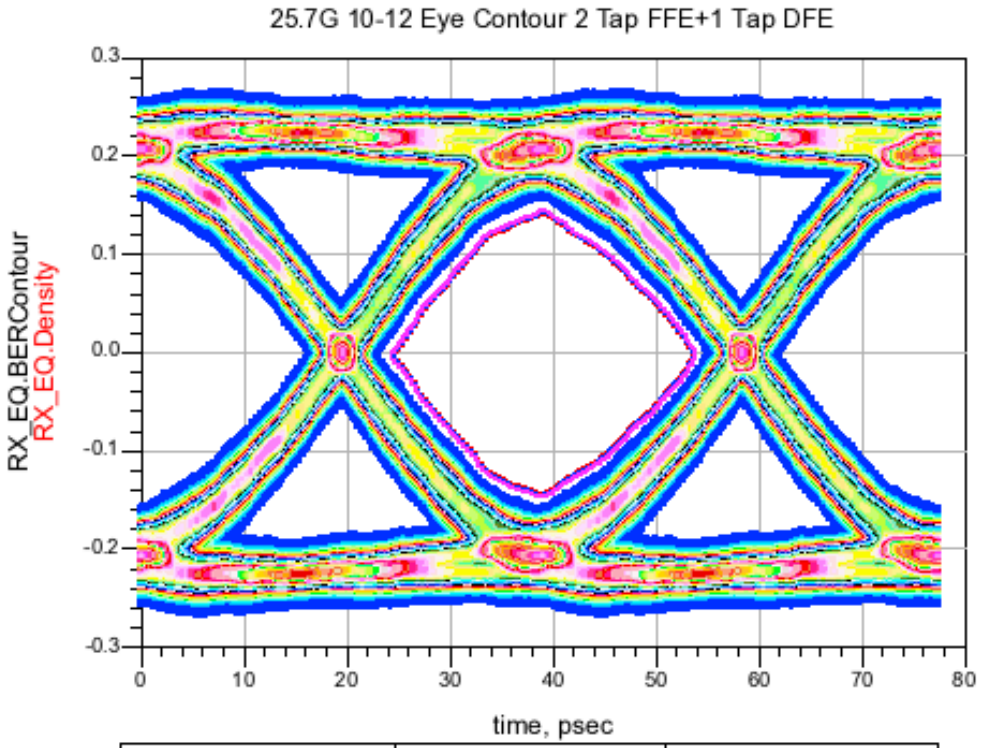

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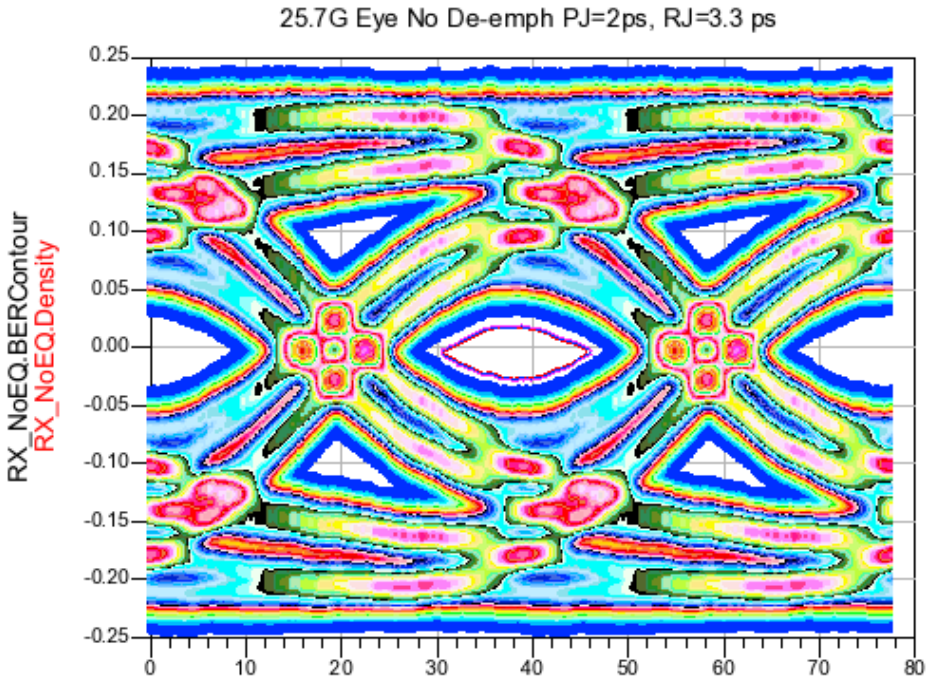
Tyco 175 mm

- **Gen 2 transmitter could meet unretimed requirements**



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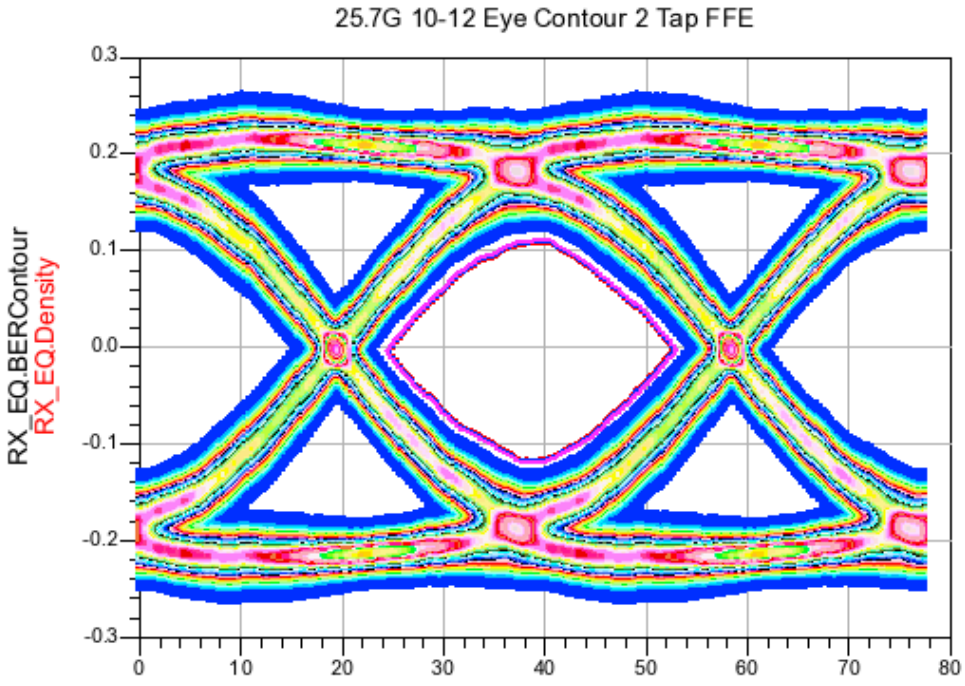

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0.000	2.821E-11	0.224

Summary

- **There is definite increase in equalizer complexity requirement as the channel loss is increased from 12 dB to 16.5 dB**
  - **16.5 dB channel would require DFE receiver**
  - **For retime interface 12 dB is possible with no power penalty**
- **Unretiemd interface can be defined based on Tyco 175 mm with loss of 8.5 dB**
- **Work in progress….**